420 Rec'd PCT/PTO 15 OCT 1999

FORM PTO 1390
(REV 5-93) US DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY DOCKET NUMBER
00035/101687/AF/JE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. §371

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)
09/403090

International Application No.	International Filing Date	Priority Date Claimed
PCT/NO98/00121	April 17, 1998	April 18, 1997

Title of Invention
MONITORING DUST DEPOSITION

Applicant(s) For DO/EO/US
Lasse LEIRFALL

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. §371.

2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. §371.

3. [X] This express request to begin national examination procedures (35 U.S.C. §371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. §371(b) and PCT Articles 22 and 39(1).

4. [X] A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. [X] A copy of the International Application as filed (35 U.S.C. §371(c)(2))
   a. [X] is transmitted herewith (required only if not transmitted by the International Bureau).
      Published Application - ATTACHMENT A
   b. [X] has been transmitted by the International Bureau per PCT/IB/308. **ATTACHMENT B**
   c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US)

6. [ ] A translation of the International Application into English (35 U.S.C. §371(c)(2)).

7. [ ] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3)).
   a. [ ] are transmitted herewith (required only if not transmitted by the International Bureau).
   b. [ ] have been transmitted by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [ ] have not been made and will not be made.

8. [ ] An oath or declaration of the inventor(s) (35 U.S.C. §371(c)(4)).

9. [ ] A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. §371(c)(5)).

Items 10. to 13. below concern other document(s) or information included:

10. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.

11. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.

12. [X] A FIRST preliminary amendment. **ATTACHMENT C**

    [ ] A SECOND or SUBSEQUENT preliminary amendment.

13. [ ] Other items or information:

THE COMMISSIONER IS AUTHORIZED TO CHARGE ANY DEFICIENCY IN THE FEE FOR THIS PAPER TO DEPOSIT ACCOUNT NO. 23-0975.

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U.S. APPLICATION NO. (If known, see 37 CFR 1.5) 09/403090	INTERNATIONAL APPLICATION NO. PCT/NO98/00121	ATTORNEY'S DOCKET NO. 00035/101687/AF/JE

17. [X] The following fees are submitted	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):		
[ ] Search Report has been prepared by the EPO or JPO..... $ 840.00		
[X] Neither international preliminary examination fee (37 CFR 1.492) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO..... $ 970.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 970.00	
Surcharge of $130.00 for furnishing the oath or declaration later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).		

Claims	Number Filed	Number Extra	Rate		
Total Claims	13 -20 =	0	X $18.00		
Independent Claims	6 - 3 =	0	X $78.00	$ 234.00	
Multiple dependent claim(s) (if applicable)			+ $260.00		
TOTAL OF ABOVE CALCULATIONS =				$1,204.00	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28)					
SUBTOTAL =				$1,204.00	
Processing fee of $130.00 for furnishing the English translation later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +					
TOTAL NATIONAL FEE =				$1,204.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40 per property +					
TOTAL FEES ENCLOSED =				$1,204.00	
				Amount to be refunded	$
				Amount to be charged	$

a. [X] A check in the amount of $1,204.00 to cover the above fees is enclosed. A duplicate copy of this form is enclosed.

b. [ ] Please charge my Deposit Account No. 23-0975 in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 23-0975. A duplicate copy of this form is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

WENDEROTH, LIND & PONACK
2033 "K" St., N.W., Ste. 800
Washington, D.C. 20006

SIGNATURE

Jeffrey Nolton
NAME

25,408
REGISTRATION NUMBER

October 15, 1999

[CHECK NO. 35290]

[99-1149*/JN/00035]

09/403090

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	:	
Lasse LEIRFALL	:	**Attn: BOX PCT**
Serial No. [Not yet assigned]	:	**Docket No. 00035/101687/AF/JE**
Filed October 15, 1999	:	
MONITORING DUST DEPOSITION	:	

[Corresponding to PCT/PCT/NO98/00121
Filed April 17, 1998]

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Kindly amend the above-identified application as follows:

IN THE CLAIMS:

Claim 4, line 1, delete "or 3".

Claim 5, line 1, delete "or 3".

Claim 12, line 1, change "any one of claims 2-11" to --claim 2--.

Claim 13, line 1, change "any one of claims 2-11" to --claim 2--.

[illegible] IS AUTHORIZED
[illegible] IN THE
[illegible] DEPOSIT
ACCOUNT NO. [illegible]

ATTACHMENT C

REMARKS

The present Preliminary Amendment is submitted to delete the multiple dependency of claims 4, 5, 12 and 13, thereby reducing the required filing fee.

Respectfully submitted,

Lasse LEIRFALL

By _____
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MONITORING DUST DEPOSITION

The present invention relates to monitoring a contaminated, dirty or inflammable condition caused by fallout dust. More specifically, the invention is directed to a new use of dust detection equipment to give warning of the presence or amount of dust or fine particles on a surface in an appliance.

A main purpose of an indicator for fallout dust is the prevention of fire and explosions. However, one may envisage several important purposes, e.g. (a) being able to prevent particular odour related to dust/particle accumulations, (b) being able to improve the efficiency of e.g. cooling units by preventing large accumulations of dust on cooling ribs, such accumulations impairing heat exchange capability, (c) general improvement/ increasing efficiency of cleaning/service/maintenance programs, i.e. demonstrating more easily a need for cleaning, (d) being able to maintain important parameters for electrical/electronic apparatuses within given tolerances.

In general it is previously known to measure dust and particle accumulations, however such measurements are typically made in industrial or research related environments. US patent no. 4,793,710 discloses e.g. a method for measuring dust layers in coal mines, based upon an optical technique, and US patent no. 5,412,221 also relates to an optical measuring method for small particle depositions ("fallout") in connection with space research. US patent no. 5,229,602 discloses an optical method for detecting contamination layers particularly on transparent surfaces (headlight glass, windshield) on vehicles.

However, the present invention is based on a need for safeguarding life , health and property also in a normal consumer environment, and then based upon solutions that can be mass produced at a low cost, especially in such a manner that measurement and display equipment can be integrated in an appliance that is usual in such a normal consumer environment.

In a consumer market that comprises products of the type TV sets, audio and video appliances, larger domestic appliances like refrigerators, stoves, etc., small domestic appliances like coffee makers etc., personal care appliances, computer products like PC's and additional equipment for such products, electrical installations in dwelling units like fuse boxes/panels, electric radiators, lamps etc., it is clear that a dust monitor may be of large interest, also in connection with the

allergy problems from which many people suffer. A good indication of dust accumulation in the close environment of an allergic subject may provide a good basis for demonstrating the efficiency of possible counter measures, or provide a basis for starting such counter measures.

As regards ordinary cleaning, a dust monitor in accordance with the invention can of course also be an aid quite simply in demonstrating the need of ordinary cleaning.

When the word "dust" is used in the present description of the invention, and in the patent claims, one has in mind dust of different types, fine particles, dirt etc. A starting point is that the dust in question is fallout dirt consisting of particles that may hover some time in the air. Additionally, within the concept of dust, it is possible to distinguish between house dust, industrial dust and traffic dust. House dust is a mixture of fabric fibers (various forms of fabrics like cotton), and pollen (different forms of pollen, i.e. grain, grass, flower pollen etc.). Industrial dust is various types of waste products like grinding dust from wood and metals, and other waste products (contamination, pollution). Traffic dust is a mixture of asphalt, exhaust and different types of gases (pollution).

Hence, the purpose of the invention is to provide a warning/indication regarding accumulation of dust in important positions for consumers, and in accordance with the invention this has been achieved through a use of the type defined in the appended patent claims.

In the following the invention shall be illuminated further by examining certain exemplary embodiments, and in this connection it is referred to the appended drawings, where

figs. 1a and 1b show schematically a dust meter of optical type, in views from above and from the side,

fig. 2 shows a circuit diagram for an optical detector used in the dust meter shown in figs. 1a and 1b,

figs. 3a and 3b show a dust meter of thermal type, in views from above and from the side,

fig. 4 shows a circuit diagram for a detector in connection with the thermal dust meter shown in figs. 3a and 3b, and

fig. 5 shows a dust meter that can be used in accordance with the invention, in its most general form.

A concrete use of the invention is, as mentioned above, in connection with detecting and giving warning regarding dust accumulation in a TV set. The embodiments now to be discussed with reference to the drawing are envisaged in such a connection, but it is emphasized once more that also other consumer appliances are of interest, as explained previously. In figs. 1 a and 1b appears a schematic layout for a dust meter that is mountable inside a TV set. A plate 2, preferably arranged horizontally will little by little accumulate dust and particles that are deposited from the air space above the plate. A light source 1 is arranged at the left end of the plate 2, which light source emits light in such a manner that it propagates at least along the top side of the plate 2, and in addition in a space above the plate that supposedly does not contain any dust, i.e. in such a height above the plate that it is improbable that a dust layer will ever grow that high. The two main light paths appear in fig. 1b, i.e. two light paths indicated by means of two divergent pairs of broken lines. (Light may of course also spread outside these directions, but such light will not be of any use in connection with the actual measurement.)

A screen 3 provides a division between the two light beams of interest, the two light beams being termed A and B, i.e. A in the dust layer area, B in the air space above the dust layer.

As appears from fig. 1a, it is favourable to have a wide light beam, or making the light beam spread such as shown in the figure 1, along the dust layer, in order to increase measurement sensitivity and to decrease uncertainty. A lens 4 collects both beam parts A and B to respective detection areas, where two separate detectors 6, 7 measure light intensities. The lens 4 may be a normal convex lens, or, such as indicated in the figure, a cylinder lens, since it may be sufficient to focus the light in the horizontal plane. It will be favourable to build both detectors 6,7, the lens 4 and the screen 3 together inside a closed box 5, indicated in the figure by broken lines.

The intensity of light beam A will be reduced when the dust thickness on plate 2 grows, while the reference light in beam B will not be influenced by this layer of dust. Dust on the light source 1 will attenuate both beams equally. It is possible to adjust the recordable dust thickness mechanically by adapting the height of the light slit between screen 3 and plate 2. The top surface of plate 2 should be dull so as to avoid reflections. As mentioned, it is favourable with a light

beam having a certain width in the horizontal plane, and this can e.g. be achieved by means of a (not shown) lens between the light source and plane 2, or by making the light source emit a relatively wide beam such as shown in fig. 1a.

Regarding the electric/electronic aspect of this matter, it is referred to fig. 2 which shows an easily realized design of the electrical circuitry that is necessary in connection with the configuration of fig. 1a/1b. The light source 1 is shown in a simple circuit at the left in the figure, in the form of a light-emitting diode (LED), and in the detection circuit to the right in the figure, detectors 6 and 7 are shown as phototransistors connected in a simple manner to provide input signals for a differential amplifier 8 (it is also possible to use photodiodes.) As the dust thickness increases, and thereby beam A is attenuated, the ratio between the two voltage inputs to the differential amplifier is upset, and the voltage output form the differential amplifier 8 will e.g. increase. This is detected by means of the comparator 9 which compares to a fixed reference voltage delivered by a simple voltage divider. If the output from comparator 9 exceeds a certain voltage, the alarm light diode 10 is switched on, and this represents a possible indication that an undesired thickness of the dust layer has been reached.

The electronic circuitry after the photo detector 6,7 will in reality depend on how the possible dust recordal shall be indicated, i.e. if, such as shown here, a light diode shall be lit, if a measurement value shall be exhibited in a display, or possibly in a TV screen, or a special indication may also be cutting the supply voltage of the TV set..

Hence, in the shown embodiment, the exceeded dust limit is marked by lighting a light diode, and by outputting a logic "high" signal. However, it is quite feasible to grade the alarm for indicating several thicknesses of dust, but this will then require a somewhat different circuit solution than what has been shown.

If the detector is to be located in an area where light can get in, the light source 1 should be modulated so that the receiver part can be AC coupled, such a solution has not been shown in the drawings either. The solution with a modulated light source will of course be a little more costly.

As a matter of principle, it will of course also be possible to transmit light "transversely" to the dust layer, that is in fig. 1b with a light source situated above plate 2, preferably with a light beam expanding element in the form of a lens, with a transparent or reflecting plate 2, and with detection below or above the plate

respectively. A reference measurement must then be made in some other manner, e.g. with a detector attached to the light source in a dust-free configuration, i.e built-in together with the light source.

Experiments that have been conducted in accordance with the solution shown in figs. 1a, 1b and fig. 2, show that the light traveling along the dust surface, will be attenuated approximately in proportion to the dust thickness. The experiments further indicate that the density of the dust layer is of little importance with this detection solution.

Quite different measurement techniques than optical detection can also be used regarding detecting dust layers, and in fig. 3a and 3b is shown a thermal detector for the same purpose. The principle utilized here, is based on the fact that a dust layer will have an insulating effect, so that the temperature in a heated surface will increase with increasing dust thickness. To achieve a reliable detection, a reference measurement toward a point that does not depend on the dust layer, should be used.

The thermal detector is built on an insulating support D in order to maintain a heat loss that is as small as possible in that direction. Heating elements may be two resistors 11 and 12 connected in parallel and placed on respective cooling surfaces 15 and 26, as shown in fig. 3a which is a top view of the detector. The cooling surface 15 is the actual dust sensor, which little by little shall be coated by dust, while cooling surface 16 is a reference. Cooling surface 16 is made insensitive to dust by covering it by an insulation layer E that is not too thick. Here it is a goal that the thermal resistance through insulation layer E shall be significantly higher than the thermal resistance in a dust layer, so that such a dust layer does not influence the heat emission from the cooling surface. In order to obtain sufficient cooling despite this, that surface is made relatively large.

Thermistors are preferably used as temperature sensors 13 and 14. (Other types of sensors are of course also of interest, e.g. thermocouples.) The dust sensor, i.e. the cooling surface 15, will have a reduced cooling effect when it is gradually covered by a dust layer, so that the temperature in the thermal sensor 13 will be a function of the dust thickness. The temperature in thermal sensor 14 will on the other hand stay substantially constant, even if dust falls upon the insulation layer E.

Closely adjacent to the thermal sensors 13 and 14 the temperature should be substantially higher than the ambient temperature. This is achieved by supplying sufficient power (about 1-5 watt), and by insulating above the thermal sensors and the heating elements (insulation layer C). The physical dimensions may be about 5 x 5 cm, and with a maximum height about 2 cm, see fig. 3b.

An example of a circuit diagram in connection with the thermal detector shown schematically in figs. 3a and 3b, appears from fig. 4. In the example in fig. 4, the end part of the detection circuit is rather similar to what appeared from fig. 2 regarding the optical detection circuit, i.e. from the differential amplifier 17 through the comparator 18 and to an alarm light-emitting diode 19. However, the photo-transistors 6 and 7 in fig. 2 are changed for thermistors 13 and 14 in fig. 4, for delivering signal voltages to the differential amplifier 17. Each one of the thermistors 13 and 14 is part of a voltage divider together with resistors, R2 and R1 respectively. The heating elements 11 and 12 are part of a separate, simple parallel circuit.

All resistors in the disclosed circuit, including the heating elements, should have a tolerance of 1% or better, while the accuracy of the supply voltage U is not critical.

Both the described solutions for detecting dust layer thickness are simple, and the total cost in mass production can be expected to be less than NOK 10 in both alternatives, the thermal solution being the cheaper one.

One further possibility for detecting a dust layer is a mechanical sensing method, which method can be based upon a strain principle or a pressure principle. The strain principle is based on bending a plate due to the dust weight. In such a case a strain gauge may be the actual sensor. When the pressure principle is used, a pressure sensor on the underside of an accumulation surface senses the weight of the dust layer, that is the superpressure coming gradually in addition to the start pressure caused by the weight of the surface/plate itself.

Independent of the type of sensor that is used, a signal from the sensor will normally have to be amplified, i.e. the amplifier succeeding the sensor, shall record current or voltage from the sensor, and adapt the level for the display unit that may be of various types. In order to make relative measurements, the amplifier should be a differential amplifier with the sensor in a measurement bridge.

SUBSTITUTE SHEET

Regarding the display unit, this unit may be of several different types. As shown in fig. 2 and fig. 4, display takes place by means of a simple light-emitting diode, which is lit when the dust layer reaches a certain thickness. It is of course also possible with a display of a more advanced type, e.g. for displaying the actual thickness of the dust layer, measured by means of a suitable unit of measure. A seven-segment type display or an intelligent display may then be utilized. Further possibilities are that the display unit may control a current switch for switching off the appliance in question if the dust thickness exceeds a critical value. Further possibilities include connection to a monitor screen with an opportunity for text in the screen. This last mentioned solution may e.g. be of interest if the dust monitor shall be built-in in an integrated manner in a TV set or a computer monitor.

In this last mentioned case it is favourable to manufacture the dust warning unit as an individual unit, or possibly as an integral part of an appliance. If the dust warning unit is produced as an individual unit, it must be suitable for fitting into the appliance at a later time. As an integral part, it will be included as a production element in an appliance, e.g. a TV set, and as previously mentioned, possibly at a very low cost.

The voltage supply may be standardized e.g. at 5,0 volts. This voltage may vary within a given range, without influencing the reliability of the dust monitor.

As previously mentioned, it is favourable to base the dust sensor on relative measurements, so that external and spurious influences shall not be disturbing.

Quite generally it is important to underline that the "warning" that shall take place, may take place in different manners. As mentioned above, one may most easily visualize a light indicator in some form (one further such indicator may be a simple luminous indication with a colour dependent on dust amount), but it may also be of interest to use an acoustic signal, i.e. some form of sound emission, and a text indication as mentioned above in connection with a TV set/computer monitor, is an important possibility. Of course, one may also visualize a combination of these indication modes.

It seems also favourable in certain applications to have the possibility that the display may provide information that the system is operational, and that it is working.

In fig. 5 appears a dust measurement device in its most general form, as mentioned above, i.e. independent of the physical measurement principle that

may be optical, thermal, weight-based, ultrasound-based, possibly based on measurement of electrical characteristics like resistance, capacity etc. Absorption/attenuation of other types of radiation than optical and ultrasound radiation can be envisaged, e.g nuclear radiation with a radiation source similar to the one that is utilized in smoke detectors. Thus, in this figure "the dust sensor", which normally will require a voltage supply, comprises some sensor type that is able to deliver a signal depending on the dust amount that is measured. The signal passes to an amplifier that delivers an output signal further to a display unit and possibly to an alarm unit. The display unit may preferably comprise or be attached to a monitor screen, and it may possibly be switchable on/off by means of a switch.

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PATENT CLAIMS

1. Use of a measurement device (1, 6-9; 11-14, 17, 18) for measuring a parameter indicating amount of dust deposited on a surface, and of an indicator (10, 19) signal-wise connected to the measurement device for specifying an indication of the parameter,
for monitoring a contaminated, dirty or inflammable condition in an electrical consumer appliance, e.g. a TV set.

2. Use of an optical measurement device (1, 6-9) for measuring attenuation of a light beam (A) transmitted through an amount of dust deposited on a surface, and of an indicator (10) connected to the measurement device (1, 6-9) for specifying a measurement value that is a function of the attenuation,
for monitoring dust thickness in an electrical consumer appliance, e.g. a TV set.

3. The use of claim 2, wherein the output intensity of the through light beam (A) is compared to the intensity of a reference light beam (B) passing outside the amount of dust.

4. The use of claim 2 or 3, wherein the light beam (A) is transmitted along and through the dust layer, possibly as a divergent or expanded beam to increase measurement sensitivity, and which beam is then possibly focused towards a photodetector (7) by means of a lens (4) situated after said surface.

5. The use of claim 2 or 3, wherein the light beam is transmitted substantially transversely to the dust layer, possibly with a reflection against the underlying surface so that the dust layer is passed twice before detection.

6. Use of a thermal measurement device (11-14, 17, 18) for measuring heat insulating ability for an amount of dust deposited on a surface, and of an indicator (19) connected to the measurement device for specifying a measurement value that is a function of said heat insulating ability,
for monitoring dust thickness in an electrical consumer appliance, e.g. a TV set.

7. The use of claim 6, wherein temperature is measured by means of a temperature sensor (15) in an object that is thermally closely attached to said surface, heat being supplied to said object (15) by means of a heating element, so that said surface emits heat radiation, said emission being dependent on the thickness of said dust layer.

8. The use of claim 7, wherein temperature is also measured in a reference object (16) which is not subject to coating by dust, and in a corresponding manner as in said object (15), known and possibly equal power being supplied to the object (15) and the reference object (16), and a comparison between the measured temperatures constitutes a basis for specified measurement value from the indicator (19).

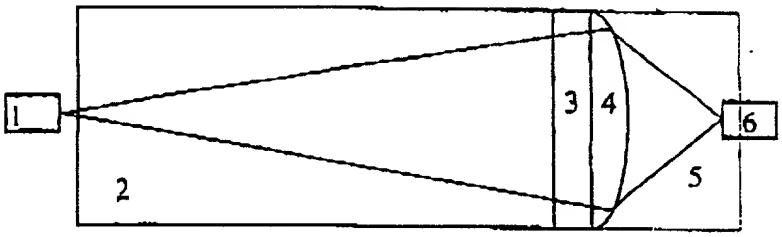
9. Use of an ultrasound measurement unit for measuring attenuation of ultrasound energy transmitted through an amount of dust deposited on a surface, and of an indicator connected to said ultrasound measurement unit for specifying a measurement value that is a function of the attenuation,
for monitoring dust thickness in an electrical consumer appliance, e.g. a TV set.

10. Use of a pressure sensor for measuring superpressure caused by an amount of dust deposited on a surface, and of an indicator connected to the pressure sensor for specifying a measurement value that is a function of said superpressure,
for monitoring dust weight in an electrical consumer appliance, e.g. a TV set.

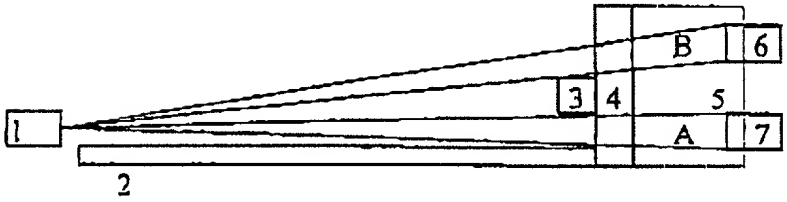
11. Use of a strain sensor for measuring degree of flexure for a plate that is subject to the weight of an amount of dust deposited on a surface on the plate, and of an indicator connected to the strain sensor for specifying a measurement value that is a function of the degree of flexure,
for monitoring dust weight in an electrical consumer appliance, e.g. a TV set.

12. The use of any one of claims 2-11, wherein said indicator displays continuously a measurement value on an analog scale or by digital display.

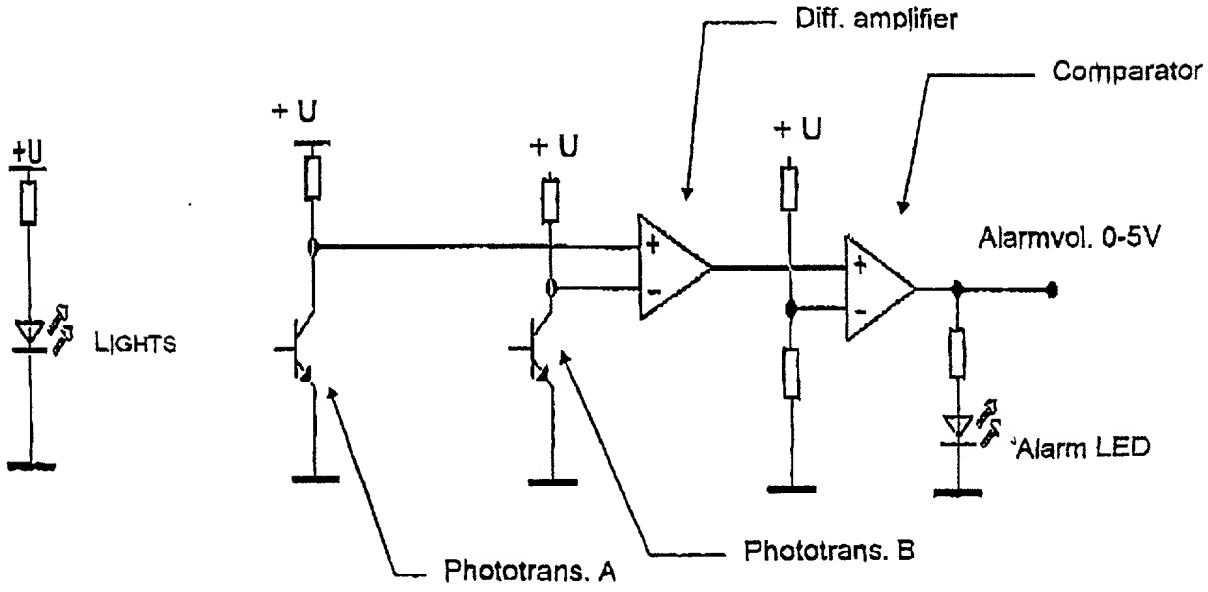
13. The use of any one of claims 2-11, wherein said indicator indicates the exceeding of a threshold value for said measurement value by delivering a warnng signal that may be of an optical or acoustical type, possibly both.



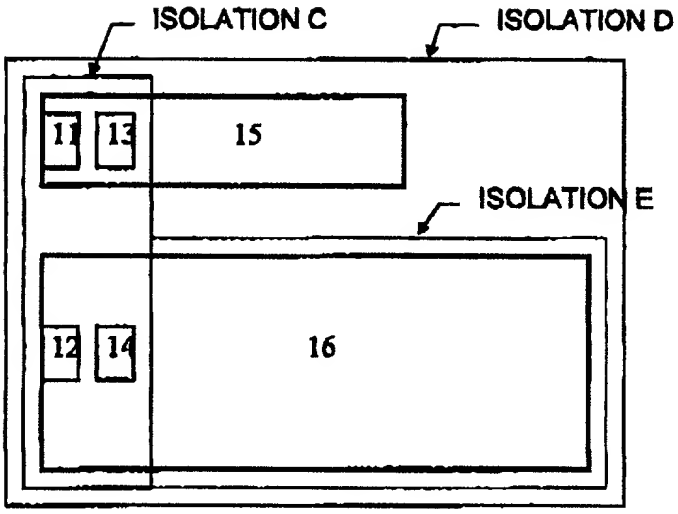
Figur 1a Dustdetektor from top



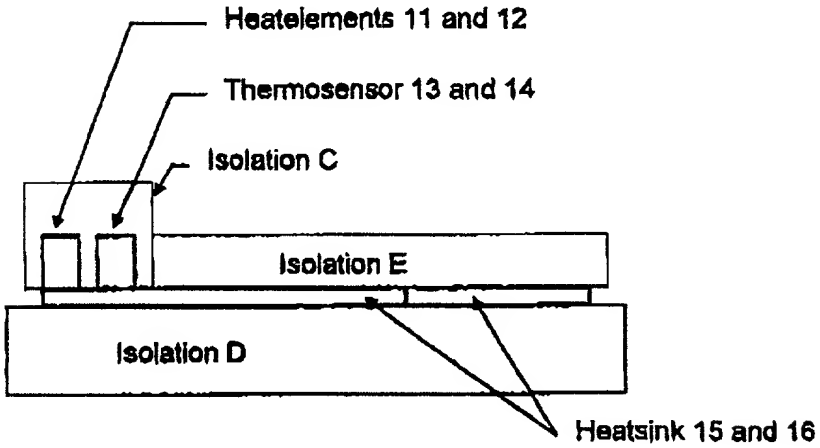
Figur 1b Dustdetektor from side



Figur 2 Schematic diagram for optisk detector

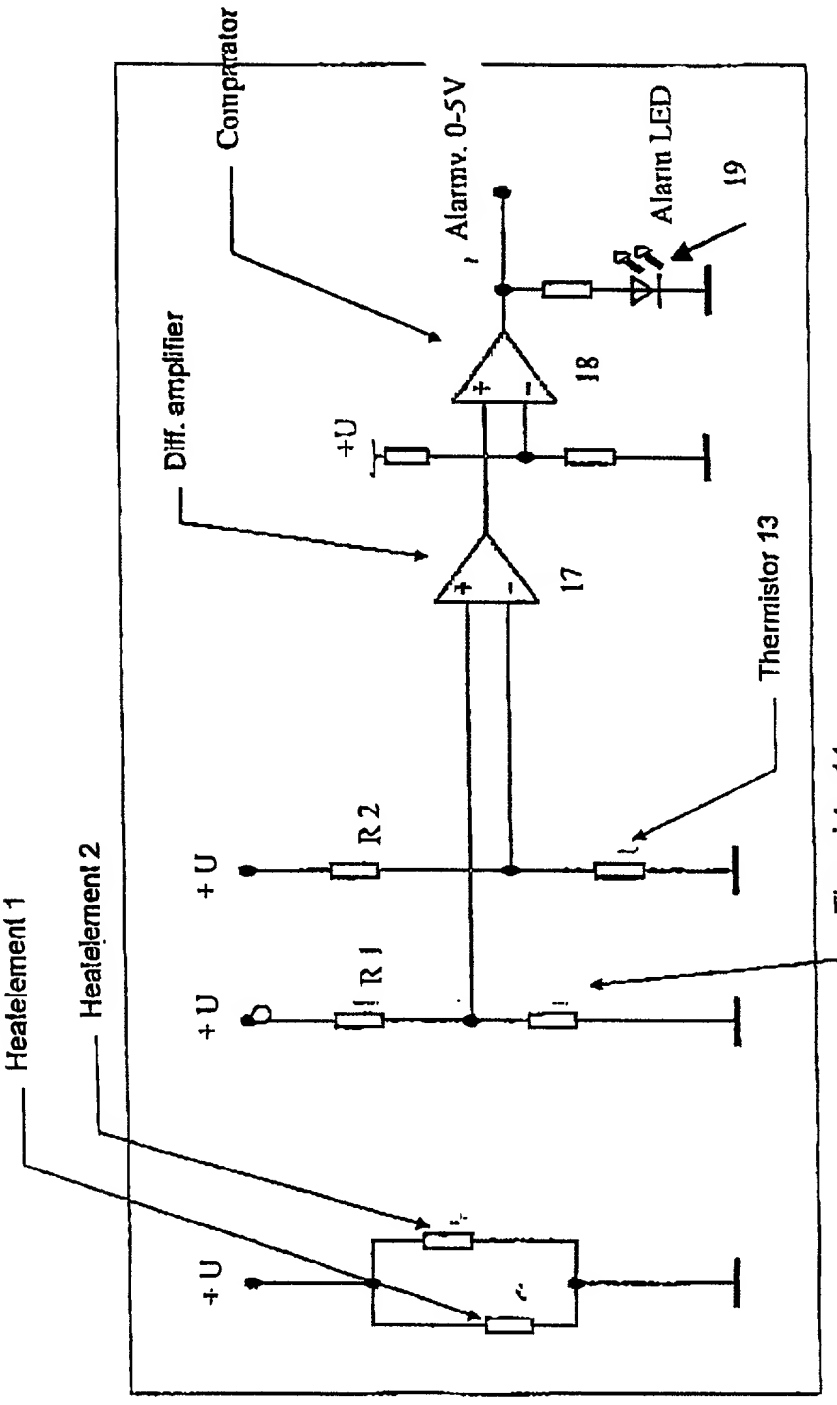


Figur 3a Thermic detector from top



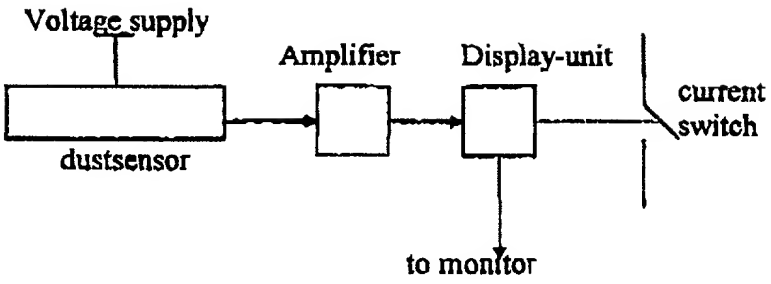
Figur 3b Thermic detector from side

SUBSTITUTE SHEET (RULE 26)



Figur 4 Schematic diagram for thermic detector

SUBSTITUTE SHEET (RULE 26)



Figur 5

COPY" DOCUMENT

DECLARATION SUPPORTING CLAIM FOR SMALL ENTITY STATUS

The undersigned hereby declare(s) that this statement is made to support a claim by the below identified entity for purposes of paying reduced fees under Sections 41(a) and (b) of Title 35, United States Code, with regard to an invention entitled MONITORING DUST DEPOSITION, invented by Lasse LEIRFALL and described in

[ ] the specification filed herewith.
[X] application Serial No. 09/403,090, filed October 15, 1999.
[ ] Patent No. _____, issued _____.

[X] a. I am/we are the inventor(s) of the above-identified application.

[ ] b. I/we would qualify as (an) independent inventor(s) as defined in 37 CFR 1.9(c) if I/we had made the above-identified application, and rights under contract law with regard to the above-identified invention have been conveyed to and remain with me/us.

[ ] c. I am [ ] the owner
[ ] an official of the below-identified small business concern;
rights under contract law with regard to the above-identified invention have been conveyed to and remain with the below-identified small business concern; and this concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under sections 41(a) and (b) of Title 35, United States Codes, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons, said number being determined and said affiliates being defined in 13 CFR 121.3-18.

No rights in the invention have been assigned, granted, conveyed or licensed or further assigned, granted, conveyed or licensed, and there is no obligation under contract or law to assign, grant, convey or license, or further assign, grant, convey or license such rights to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which any rights in the invention have been assigned, granted, conveyed, or licensed or further assigned, granted, conveyed, or licensed or further assign, grant, convey or license, or as to where there is an obligation under contract or law to assign, grant, convey, or license such rights is listed below:

[X] no such person, concern, or organization
[ ] persons, concerns or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME _____

ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

FULL NAME _____

ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

I/we acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b).)

I/we further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that

ATTACHMENT "E"

such willful false statements may jeopardize the validity of the application or any patent issuing thereon, or any patent to which this declaration is directed.

Lastie LEIRFALL — 2/11-99

NAME — SIGNATURE — DATE

NAME — SIGNATURE — DATE

NAME OF SMALL BUSINESS CONCERN — ADDRESS

NAME — SIGNATURE — DATE

TITLE

COPIED: 07/06/04

10 DEC1999

Rev. 11-3/96.

Effective March 1998

DECLARATION AND POWER OF ATTORNEY FOR U.S. PATENT APPLICATION

(X) Original ( ) Supplemental ( ) Substitute (X) PCT ( ) DESIGN

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that I verily believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Title: MONITORING DUST DEPOSITION

of which is described and claimed in:
( ), the attached specification, or
( ) the specification in application Serial No. _____, filed October 15, 1999, and with amendments through _____ (if applicable), or
(X) the specification in International Application No. PCT/NO98/00121, filed April 17, 1998, and as amended on _____ (if applicable).

I hereby state that I have reviewed and understand the content of the above-identified specification, including the claims, as amended by any amendment(s) referred to above.

I acknowledge my duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim priority benefits under Title 35, United States Code, §119 (and §172 if this application is for a Design) of any application(s) for patent or inventor's certificate listed below and have also identified below any application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

COUNTRY	APPLICATION NO.	DATE OF FILING	PRIORITY CLAIMED
NORWAY	971822	April 18, 1997	Yes

I hereby claim the benefit under Title 35, United States Code §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose information material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

APPLICATION SERIAL NO.	U.S. FILING DATE	STATUS: PATENTED, PENDING, ABANDONED

And I hereby appoint Michael R. Davis, Reg. No. 25,134; Matthew M. Jacob, Reg. No. 25,154; Jeffrey Nolton, Reg. No. 25,408; Warren M. Cheek, Jr., Reg. No. 33,367; Nils Pedersen, Reg. No. 33,145; and Charles R. Watts, Reg. No. 33,142, who together constitute the firm of WENDEROTH, LIND & PONACK, L.L.P., jointly and severally, attorneys to prosecute this application and to transact all business in the U.S. Patent and Trademark Office connected therewith.

I hereby authorize the U.S. attorneys named herein to accept and follow instructions from BRYN & AARFLOT AS as to any action to be taken in the U.S. Patent and Trademark Office regarding this application without direct communication between the U.S. attorneys and myself. In the event of a change in the persons from whom instructions may be taken, the U.S. attorneys named herein will be so notified by me.

ATTACHMENT "D"

I further declare that all statements made herein of my own knowledge are true, and that all statements on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

1st Inventor _____ Date 20/11-99
Lasse LEIRFALL

2nd Inventor _____ Date _____

3rd Inventor _____ Date _____

4th Inventor _____ Date _____

5th Inventor _____ Date _____

6th Inventor _____ Date _____

The above application may be more particularly identified as follows:

U.S. Application Serial No. [Not yet assigned] Filing Date October 15, 1999

Applicant Reference Number 101687/AF/JE Atty Docket No. 00035/101687/AF/JE

Title of Invention MONITORING DUST DEPOSITION

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Full Name of Fifth Inventor	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME	
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Full Name of Sixth Inventor	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME	
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